Social Integration in Adolescence and Physiological Dysregulation in Young Adulthood

Kathleen Mullan Harris, Karen Gerken, and Yang Yang
The University of North Carolina at Chapel Hill

Introduction

A large literature has found that good social relationships are associated with improved physical and mental health (review in Smith and Christakis 2008). Social ties, embeddedness in social networks, and engagement in social life have been found to boost self-esteem, protect against illness, and facilitate coping with stress and injury or disease. Social isolation and the lack of social connections are harmful for health. The social stress model posits that the stress caused by social isolation carries negative consequences, primarily for mental health (Pearlin et al 1981). On the other hand, social integration moderates stress, thus acting as a protective factor.

Most research on the relationship between social integration/social isolation and health has focused on older and/or aging populations (e.g., Seeman et al. 1987). This focus makes sense because later life is often characterized by a number of stressful events, including retirement, bereavement, and the onset of chronic conditions. Social networks and support are important for managing and coping with these stressful transitions. There has been little attention to the association between social relations and health and its underlying mechanism during the early stage of the life course, yet physiological response to stress related to the profound developmental, social, and emotional transitions young people experience in adolescence can be equally consequential for health trajectories set in early life. Indeed recent public attention to the role of social isolation and lack of social networks in youth depression, violence, and victimization (i.e., bullying) demonstrates that research needs to start earlier in understanding how adolescents' social connections shape their social affiliative behaviors in adulthood and matter for health across the life course.

A growing literature indicates that early life conditions are important predictors of adult health (Currie 2011; Johnson and Schoeni 2011). In this paper we ask an important question that remains; that is, how long is the arm in adolescence and in what contexts does it reach to impact health trajectories into adulthood? We investigate how social integration and isolation in adolescence may have long lasting effects on physiological dysregulation in young adulthood, as indicated by objective biomarker measures of cardiovascular and immune functions including inflammation, blood pressure, and latent viral infection. We use longitudinal data from the National Longitudinal Study of Adolescent Health (Add Health) and measure the social integration and isolation of adolescents in the multiple contexts of adolescent life—in their family, among peers, in the school and in the community.

Data and Measures

Add Health first surveyed a nationally representative cohort of adolescents in grades 7 – 12 in 1994-95 in the US and followed the cohort with three subsequent interviews in 1996, 2001-02 and 2008-09. We use objective measures of physical health based on biomarkers collected in Wave IV when the cohort was aged 24-32. We have selected markers of biophysiological mechanisms in response to stress, that also represent important risk factors for future cardiovascular disease. To the extent that social isolation and lack of social ties is related to chronic stress, these measures represent biological manifestations of this chronic stress. They include blood pressure (systolic blood pressure [SBP], diastolic blood pressure [DBP], and a

binary indicator of high blood pressure); C-reactive protein (CRP), a measure of innate immune function and systemic inflammation; and Epstein-Barr Virus antibodies (EBV), an indicator of cell-mediated immune function and indirect measure of chronic stress. Previous research using these measures has shown that higher social integration among adults was associated with lower CRP (Ford et al. 2006; Yang and Kozloski 2011), SBP, (Yang and Kozloski 2011) and EBV (McDade 2003), indicating that connectedness buffers the deleterious effects of stress and improves health. However, most empirical work has focused on cross-sectional examinations of older adults.

SBP and DBP are linear measures of cardiovascular health, where higher values indicate worse cardiovascular functioning, often brought on by stress. EBV is a linear measure where high values indicate higher levels of the EBV antibodies and lower cell-mediated immunity in response to stress. CRP is measured on a linear scale as well, though we use the logarithm of CRP to adjust for the severe right-skewedness of the CRP distribution. For all three outcomes, higher values indicate increased risks of physiological dysregulation.

To measure social integration at multiple levels of the social environment of youth, we construct a binary measure of integration within each of four contexts in which adolescents are embedded: family, peers, school and community at baseline (Wave I). High family integration is measured by whether the adolescent engaged in 5 or more activities with his or her parents(s) in the last four weeks. High integration into peer networks is measured by receiving 7 or more friendship nominations (i.e., in-degree) by fellow schoolmates. High school integration is measured by engaging in 4 or more school activities; and community integration is measured by attending religious service 12 or more times in a year. We then sum the dichotomous integration measures in each context to construct a cumulative index of social integration ranging from 0 to 4. Higher scores indicate more integration (e.g., more activities with parents, more friends, greater participation in school clubs and sports, and more attendance at religious services).

Our primary hypothesis is that greater social integration and less social isolation in adolescence (measured at baseline) is associated with better health, or lower levels of EBV, CRP and blood pressure in young adulthood (measured at Wave IV in adulthood).

Methods

We conduct bivariate and multivariate analysis, using the appropriate regression for each dependent variable (i.e. linear regression for SBP, DBP, CRP, and EBV; logistic for binary indicator of hypertension). Multivariate analysis will include control variables for other important risk factors for increasing these biomarkers, including race, age, sex, BMI and socioeconomic status.

Preliminary Results

Table 1 presents the weighted means and standard errors for the variables used in our analysis. The mean SBP (124.936), EBV (150.676) and log of CRP (.686) are close to normal, healthy clinical cutoffs for each measure. More than half of the sample can be considered highly integrated in terms of religious attendance (60%). In the other three contexts, approximately one-fourth of the respondents have high integration. 23.5% participate in four or more school activities, 24.7% have seven or more friends and 27.2% do five or more activities, on average with their parents. The mean SI Index score was 1.35, indicating most respondents are integrated in at least one context.

Table 2 shows the relationship between our constructed social integration index and three health outcomes measures (SBP, CRP and EBV), controlling for race/ethnicity, sex and age. Increases in social integration scores resulted in significant decreases for all three objective health outcomes, confirming our hypothesis.

Future Analysis and Contributions

Future analysis will move beyond the basic models introduced here. We will add additional controls for socioeconomic status and other individual characteristics known to impact health, such as BMI. We also plan to investigate whether integration levels remain the same throughout the life course, such that integration in adolescence is simply an indicator of endogenous personality traits that persist into adulthood. We will examine other health outcome measures, including diastolic blood pressure and a binary measure of hypertension that includes both measured blood pressure and self-reported diagnosis of and medication for hypertension. With such additional analysis planned, our future paper will demonstrate the extent to which social integration in adolescence continues to impact health into early adulthood.

References

Currie Janet. 2011. "Inequality at Birth: Some Causes and Consequences." *American Economic Review* 101(3):1–22.

Ford, Earl, Eric Loucks and Lisa Berkman. 2006. "Social Integration and Concentrations of C-Reactive Protein Among US Adults." *Annals of Epidemiology* 16:78-84.

Johnson, Rucker and Robert Schoeni. 2011. "Early Life Origins of Adult Disease: National Longitudinal Population-Based Study of the United States". *American Journal of Public Health* 101:2317 – 2324.

Pearlin, Leonard I., Elizabeth G. Menaghan, A. Lieberman Morton, and Joseph T. Mullan. 1981. "The stress process." *Journal of Health and Social Behavior* 22 (4):337-356.

Seeman, Teresa E., George A. Kaplan, Lisa Knudsen, Richard Cohen, and Jack Guralnik. 1987. "Social network ties and mortality among the elderly in the Alameda County Study." *American Journal of Epidemiology* 126 (4):714–723.

Smith, Kirsten P. and Nicholas A. Christakis. 2008. "Social Networks and Health." *Annual Review of Sociology* 34:405-429.

Yang, Yang and Michael Kozloski. 2011. "Sex Differences in Age Trajectories of Physiological Dysregulation: Inflammation, Metabolic Syndrome, and Allostatic Load." *Journals of Gerontology: Biological Sciences* 66A: 493-500.

McDade, T.W. 2003. "Life event stress and immune function in Samoan adolescents: toward a cross-cultural psychoneuroimmunology." In *Social and Cultural Lives of Immune Systems*, ed. J. Wilce. New York: Routledge, 170-88.

Table 1: Descriptive Statistics of Selected Variables (weighted)

Dependent Variable	**Mean**	**SE**
SBP	124.936	0.240
EBV	150.676	1.781
Log of CRP	0.686	0.025
Integration Measures		
12+ Religious Services/yr	0.600	0.016
4+ School Activities	0.235	0.011
7+ Friends	0.247	0.012
5+ Parent Activities/week	0.272	0.008
Social Integration Index	1.355	0.029
Controls		
Female	0.503	0.009
Age 16+	0.451	0.032
Black	0.165	0.252
Asian	0.038	0.126
Native American/Other	0.013	0.376
Hispanic	0.094	0.500

Table 2: Relationship between Social Integration Index and Health Outcomes

	CRP	**EBV**	**SBP**
SI Index	-0.0598***	-2.202*	-0.606***
	(0.0218)	(1.223)	(0.161)
Black	0.123**	24.36***	2.064***
	(0.0617)	(4.072)	(0.530)
Asian	-0.595***	-7.212	-1.911*
	(0.0886)	(6.927)	(1.145)
NA/Other	-0.157	13.84	-1.306
	(0.262)	(9.662)	(2.357)
Hispanic	0.166**	13.33**	-0.870
	(0.0645)	(6.419)	(0.800)
Females	0.578***	25.58***	-9.595***
	(0.0426)	(3.361)	(0.380)
Age 16 +	-0.0167	3.913	1.254***
	(0.0410)	(2.581)	(0.414)
Constant	-0.106	107.7***	139.4***
	(0.0802)	(5.156)	(0.717)
R-squared	0.055	0.025	0.135

Standard errors in parentheses
*** p<0.01, ** p<0.05, * *p<0.1